



U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

DCS-NRC-000279
5 October 2010

SUBJECT: Docket No. 070-03098
Construction Authorization No. CAMOX-001
Shaw AREVA MOX Services Reply to a Notice of Violation

REFERENCE: 1. Letter from Deborah A. Seymour to Kelly D. Trice dated August 6, 2010 entitled "Mixed Oxide Fuel Fabrication Facility - NRC Inspection Report No. 70-3098/2010-002 and Notice of Violation"

2. Letter from Anthony D. Masters, Acting Chief Construction Projects Branch 1 Division of Construction Projects to Kelly D. Trice dated September 7, 2010 entitled "Acknowledgement to Mixed Oxide (MOX) Fuel Fabrication Facility -NRC Inspection Report 70-3098/2010-001 (Extension Request for Reply to a Notice of Violation)"

Shaw AREVA MOX Services hereby submits its reply to the Notice of Violation (NOV) contained in Reference 1.

Reference 2 documents NRC R-II approval to MOX Services' request for 30-day extension for the reply to the NOV.

If you have any questions, please contact Dave Kehoe, Regulatory Compliance Manager, at (803) 819-2658.

Sincerely,

A handwritten signature in black ink that reads "Kelly Trice". The signature is written in a cursive, flowing style.

Kelly D. Trice
President and COO (Acting)

JE07

Enclosures:

- (1) Shaw AREVA MOX Services Reply to a Notice of Violation
- (2) Flanders (Subcontractor to Shaw AREVA MOX Services) supporting documentation for the Reply to the subject Notice of Violation

cc: (w/ enclosures)

Roger Alley, MOX Services
Michael Bagale, MOX Services
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EDMS: Corresp\Outgoing\NRC\2010 NRC\DCS-NRC-000279

Enclosure 1

Shaw AREVA MOX Services
Reply to a Notice of Violation

Notice of Violation

During Nuclear Regulatory Commission (NRC) inspection activities conducted April 1 through June 30, 2010, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

- A. Condition 3.A of NRC Construction Authorization No. CAMOX-001, Revision (Rev.) 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide Fuel Fabrication Facility located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MOX Project Quality Assurance Plan (MPQAP) dated March 26, 2002, and supplements thereto (MPQAP, Rev. 8, dated August 20, 2009).

MPQAP, Section 16, Corrective Action, states in part, that conditions adverse to quality be promptly identified and corrected.

MOX Project Procedure (PP) 3-6, Corrective Action Process, Section 3.3.1 requires, in part, that adverse conditions shall be promptly identified, evaluated, and corrected. PP 3-6, Section 3.5.1 further requires that MFFF personnel shall promptly identify and document problems, including adverse conditions.

Contrary to the above, between June 10 and 11, 2010, the applicant failed to identify and correct conditions adverse to quality during quality control and field engineering inspections of the minimum and maximum concrete clear cover of installed rebar prior to installation of the formwork for MFFF walls BMP-W217 and BMP-W219/223.

This is a Severity Level IV violation (Supplement II) (70-3098/2010-002-001)

- B. Condition 3.A of NRC Construction Authorization No. CAMOX-001, Rev. 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide Fuel Fabrication Facility located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MPQAP dated March 26, 2002, and supplements thereto (MPQAP, Rev. 8, dated August 20, 2009).

The MPQAP, commits the applicant to the American Society of Mechanical Engineers (ASME) NQA-1-1994, Quality Assurance Requirements for Nuclear Facility Applications, including supplements and Part II as revised by the ASME NQA-1a-1995 Addenda for implementation of 10 CFR 50 Appendix B. Attachment I of the MPQAP, Part II Applicability to MOX Project, provides no exceptions to Subpart 2.5, Section 5: Inspection of Soils and Earthwork.

MPQAP, Section 3, Design Control, states, in part, that "Measures are established in MOX Services QA procedures to assure that applicable requirements are correctly translated by MOX Services into design documents."

Contrary to the above, on February 23, 2010, the applicant failed to translate applicable ASME/NQA-1-1994 requirements into construction specification DCS01-WRT-DS-SPE-B-09307, Section 02316-Excavation, Backfilling, and Compaction for Utilities, Quality Level 1a (IROFS), Rev. 2. Specifically, Engineering Change Request (ECR) 005683, Rev. 0 introduced and approved the option to eliminate the field density test requirement per ASTM D1556, which was required by NQA-1-1994, Subpart 2.5, Section 5, from construction specification DCS01-WRT-DS-SPE-B-09307, Rev. 2.

This is a Severity Level IV violation (Supplement II). (70-3098/2010-002-002)

- C. Condition 3.A of NRC Construction Authorization No. CAMOX-001, Rev. 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide Fuel Fabrication Facility located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MPQAP dated March 26, 2002, and supplements thereto (MPQAP, Rev. 8, dated August 20, 2009).

MPQAP, Section 2.1.1 states, in part, that the MOX Project Quality Assurance Plan complies with 10 CFR 50, Appendix B, Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants, and applies to MOX Services, including subcontractors, who perform quality-affecting activities.

Title 10 of the Code of Federal Regulations (CFR) Part 50 Appendix B Criterion IX states: "Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements."

MPQAP, Section 8.2.4, states, in part, that if codes, standards or specifications include specific identification or traceability requirements (i.e., identification or traceability of the item to applicable specification or grade of material; heat, batch, lot, part or serial number; or specified inspection, test or other records), then identification and traceability methods shall implement the requirements specified. MOX specification DCS01-ZMJ-DS-SPE-M-19113-4, Glovebox Shell Fabrication, Inspection and Test Requirements, Section 2.1.3 Material Certification, states, in part, that traceability of metals shall be provided through all phases of fabrication and to the end product.

MPQAP, Section 10.2, states, in part, that inspection activities are documented and controlled by instructions, procedures, drawings, checklists, travelers or other

appropriate means. Documented inspection planning shall include identification of when, during the work process, inspections are to be performed for those characteristics. MPQAP, Section 5.2.2, Content of Implementing Documents, states, in part, implementing documents shall include the following information as appropriate to the work to be performed. Section 5.2.2.C requires a sequential description of the work to be performed (unless otherwise specified) including controls for altering the sequence of required inspections, tests and other operations.

Contrary to the above, prior to June 24, 2010, MOX Services failed to ensure that measures were established to assure that welding performed by its supplier was controlled and accomplished by qualified procedures. MOX Services failed to conform with specified technical and quality assurance (QA) requirements, as evidenced by the following examples:

1. The applicant failed to ensure that special processes such as welding used by its vendor performing quality-affecting activities were controlled and accomplished by qualified procedures in accordance with the applicable codes, standards, and specifications. Specifically, MOX Services' vendor performed tack welding on the base-plate of glovebox NBX1000 without using a procedure qualified to the requirements of American Welding Society D1.6: Structural Welding Code- Stainless Steel.
2. The applicant failed to ensure that its vendor provided traceability of metals during all phases of fabrication of glovebox NBY1000 as noted in the following examples:
 - a) The weld map (which contains heat numbers and welder identification numbers) of Glovebox NBY1000 was found to be incorrectly filled out, in that a weld was completed and not signed off on the weld map, instead another weld number was signed off on the weld map but the weld had not yet been completed.
 - b) The base plates of Gloveboxes NBX1000 and NBY1000 were symmetrical and without a marking on the base plate to identify a reference location, thus, an individual cannot correlate specific welds on the base plate accurately to those specified on the corresponding weld map.
3. The applicant failed to assure that its vendor used documented inspection planning during work activities on Quality Level 1 (QL-1) components, in that, work process documents did not contain sequential descriptions of the work to be performed, including the controls for altering the sequence of required inspections.

This is a Severity Level IV violation (Supplement II). (70-3098/2010-002-003)

- D. Condition 3.A of NRC Construction Authorization No. CAMOX-001, Rev. 2, dated June 12, 2008, authorizes, in part, the applicant to construct a plutonium processing and mixed oxide fuel fabrication plant, known as the Mixed Oxide Fuel Fabrication Facility located at the Department of Energy's Savannah River Site, in accordance with the statements, representations, and conditions of the MPQAP dated March 26, 2002, and supplements thereto (MPQAP, Rev. 8, dated August 20, 2009).

MPQAP, Section 7.1, states, in part, that MOX Services procurement of Quality Level 1 and Quality Level 2 material, equipment and services is controlled to assure conformance with specified technical and QA requirements and that evaluations of received items and services are performed, as necessary, upon delivery or completion to ensure requirements specified in procurement documents are met.

MPQAP, Section 7.2.12.C.5, states, in part, that prior to release as a commercial grade item, the applicant shall determine that inspection and/or testing is accomplished as required, to assure conformance with critical characteristics and that documentation, as applicable to the item, was received and is acceptable.

Contrary to the above, prior to June 24, 2010, the applicant failed to perform or verify that the required inspection and/or testing were accomplished to assure conformance with critical characteristics. In addition, the applicant failed to perform evaluations of received items and services, as necessary upon delivery or completion, to ensure that requirements specified in procurement documents were met. The applicant also failed to determine that inspection and/or testing was accomplished as required, to assure conformance with critical characteristics and that documentation, as applicable to the item, was received and acceptable as evidenced by the following example:

1. MOX Services failed to specify and perform the necessary inspection and/or testing to verify that the S30403 (304L) material used to fabricate the KCB 3000/4000/7000, gloveboxes met the requirements of ASTM A240/240M, Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications. Specifically, MOX Services failed to adequately verify that the carbon content of the 304L material does not exceed 0.03% as specified in Table 1, Chemical Composition Requirements, of ASTM A240/240M. MOX Services specified the glovebox material (type/alloy/grade/class) as a critical characteristic for acceptance in Attachment B of DCS01-ZMJ-DS-CGD-M-65858-2, Commercial Grade Item Evaluation (CGIE) for Ferrous Steel Material for Gloveboxes and Subassemblies. MOX Services has implemented a positive material identification (PMI) program to measure the metallic content of materials (e.g., chromium, nickel, and manganese); however, PMI is not capable of measuring non-metallic compounds within materials such as carbon, sulfur

and silicon. Due to this limitation, the use of PMI is not considered adequate to differentiate between S30400 (304) and S30403 (304L) stainless steel materials. Low carbon stainless steel (304L) is considered important to prevent the sensitization (corrosion) of the material that may arise as a result of welding during fabrication.

This is a Severity Level IV violation (Supplement II). (70-3098/2010-002-004)

Pursuant to the provisions of 10 CFR 2.201, Shaw AREVA MOX Services is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at the Mixed Oxide Fuel Fabrication Facility construction project, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. ...

Reply to a Notice of Violation

MOX Services agrees with the violations listed in the NRC Inspection Report No. 70-3098/2010-002. MOX Services response including the reason for the violation; the corrective steps that have been taken; the corrective steps that will be taken to avoid further violations; and the date when full compliance will be achieved, is documented below. Individual Activity Completion Dates (other than "the date when full compliance will be achieved") listed in the body of this document are not commitments. These dates primarily indicate sequence of events for scheduling purposes.

VIO: 70-3098/2010-002-001 Failure to Identify Rebar Installations that did not Meet Clear Cover Requirements

Brief description of the issue:

The [NRC] inspectors performed inspections of the BMP walls prior to closure (form installation) on June 9 and 10, 2010. The inspectors noted several instances where rebar placement did not meet clear cover requirements both for minimum and maximum clear cover. The inspectors noted that MOX QC personnel had not identified out of tolerance condition of the rebar prior to installation of the forms.

Reason for the violation:

The Field Engineering and Quality Control process for verifying minimum and maximum clear cover have in-process inspections and a final inspection. The final verification for clear cover occurs after the forms are set in place. For those cases where minimum and/or maximum clear cover deficiencies exist that must be corrected prior to setting the forms, Inspection Exception Reports (IERs) are initiated by Quality Control during their in-process inspections.

Several IER's (Inspection Exception Reports) were written to document in-process inspections involving clear cover issues for the wall placements. For example, MOX QC generated 48 IER's for placements; of those 18 IERs (BMP-W217 - 562, 567, 670, 671, 672, 771, 897, 905, 923, 925; BMP-W219 - 665, 666, 707, 708, 710, 713, 718; BMP-W223 - 792) dealt with in process clear cover issues for placements for BMP-W-217 and BMP-W223/219.

In reviewing the controls, MOX Services has identified that in some cases where the wall thickness is small or the localized rebar congestion is high there may be reliance on in-process inspections for final acceptance. The current controls for work require construction to notify QC whenever work impacts a hold or witness point that has been final inspected. This control did not require notification for in-process inspections. Thus, in those instances where there was reliance on in-process inspections for final acceptance, the inspection could be impacted by subsequent work activities.

Corrective steps that have been taken:

1. Quality Control Inspection Plan C-112 has been revised (reference revision 17) to add the following:
 - When it is determined that a wall or a portion of a wall will be inaccessible during the final inspection after the forms are set in place, an in-process inspection report will be issued documenting the inspection results for the inaccessible areas. The inspection report shall define the inaccessible areas.
2. Corresponding inspection report form C112A has been revised (reference revision 4) to add witness points as follows:
 - Witness points at the time of setting the forms were added as follows: For inaccessible areas, verify that the in-process inspection results for the inaccessible areas have not changed and that during form installation no work activities are performed that would impact the inspection results for the inaccessible areas.

Corrective steps taken to avoid further violation:

1. Quality Control Civil inspectors will be briefed on the changes to the inspection plan and management expectations by October 15, 2010.
2. Field Engineers will be briefed on the changes to the inspection plan and management expectations by October 15, 2010.
3. The changes to the Quality Control Inspection Plan C-112, Revision 16, the C-112 Inspection Report, current requirements in PP11-35 and PP3-31, provide procedural assurances that violations of this nature should be prevented in the future.

Date when full compliance will be achieved:

Full compliance should be achieved by October 30, 2010.

VIO 70-3098/2010-002-002 Inadequate Construction Specification Change

Brief description of the issue:

The direction provided by ECR-005683 for a revision to the construction specification DCS01-WRT-DS-SPE-B-09307, Excavation Backfilling, and Compaction of Utilities, Rev.2, for performing the field density test per ASTM D2922 (nuclear gauge test method) without having to correlate the field density test per ASTM D1556 (sand cone test method) is in violation of ASME NQA-1-1994 Part II, Subpart 2.5, Section 5, Inspection of Soils and Earthwork.

Reason for the violation:

NRC Inspection Report 70-3098/2010-001 resulted in a violation (70-3098/2010-001-003) identifying that the testing requirements for backfill material did not fully meet NQA-1, Subpart 2.5 requirements. Condition Report CR-10-180 was initiated to track the investigation and resolution of that concern. During NRC inspection 70-3098/2010-002, the NRC inspector identified that specification DCS01-WRT-DS-SPE-B-09307, Rev. 2 was changed by ECR 005683 resulting in additional testing requirements for backfilling not being consistent with NQA-1, Subpart 2.5. At the time of this identification CR-10-180 was in manager review for closure and would subsequently be subject to verification prior to full closure. Based on manager review and NRC comments, CR-10-180 was revised to require a review of all parts of NQA-1, Subpart 2.5. Additionally, a hold was placed on QL-1 backfill activities pending resolution of the backfill compliance to NQA-1, Subpart 2.5 and updating of the appropriate documentation including specification DCS01-WRT-DS-SPE-B-09307, Rev. 2.

The failure to properly verify the requirement for the testing was due to the lack of recognition that the specification for the utility trenching for QL-1 soils required strict compliance to the requirements of NQA-1 or exceptions properly documented and approved. The removal of the required sand cone tests (ASTM D1556) was based on an interpretation of the specification that a nuclear density gauge calibrated to the requirements of ASTM D2922 would provide adequate and technically sound data for in place density testing.

At this time the work associated with specification DCS01-WRT-SPE-B-09307, Rev. 2 only involves the installation of the waste line. Currently there are less than 300 cubic yards of material that has been placed, which is still within the testing range per NQA-1, Subpart 2.5 (Table 5.6). Additionally, three test sets of sand cones have been taken to demonstrate correlation to the nuclear density tests

At MOX Services, QL-1 backfill is for structures and utilities. The specification for QL-1 structures, DCS01-WRT-SPE-B-09304, Rev. 3, Construction Specification Section 02310 – Excavation, Backfilling, and Compaction for Structures, has the required sand

cone correlations and testing. Therefore, it is concluded the extent of this condition regarding correlation testing is limited to QL-1 backfill associated with utilities.

Corrective steps that have been taken:

1. CR-10-180 was revised to include the following action items:
 - MOX-AT-10-636 Identify NQA-1 Subpart requirements
 - MOX-AT-10-635 Perform a reconciliation of MOX project specification DCS01-WRT-DS-SPE-B-09307, Rev. 2 and basis of design documents DCS01-AAJ-DS-DOB-B-40102 Basis of Design for Site/Geotechnical and DCS-AAJ-DS-DOB-40103 Basis of Design for Structures to NQA-1, Subpart 2.5 requirements
 - MOX-AT-10-869 Update specification DCS01-WRT-DS-SPE-B-09307, Rev. 2, based on reconciliation
 - MOX-AT-10-870 Perform sand cone correlation testing and justify previously placed material that did not have sand cone testing
 - MOX-AT-10-871 Lift administrative hold on QL-1 backfill activities after specification DCS01-WRT-DS-SPE-B-09307, Rev. 2 is updated.
2. The reconciliation for compliance to NQA-1, Subpart 2.5, Section 5, regarding backfill, is complete for the specifications. The review identified several areas where the backfill activities performed on the trench were not in full compliance with NQA-1, Subpart 2.5. ECRs 006415, 008741 and 008891 were issued and ECR 005683 was revised to change the impacted specifications. The ECRs identify where (1) MOX Services takes exception to portions of NQA-1, Subpart 2.5; (2) provide instructions where compliance is required; and (3) provides technical justification for acceptance of previously performed backfill activities, where appropriate. Summary of ECRs:
 - ECR 005683 was revised to include sand cone testing and correlation of the sand cone data to the Nuclear Density test data per ASTM 2922.
 - ECR 006415 was issued to include backfill unit weight requirement
 - ECR 008741 was issued to provide additional instructions needed to ensure compliance to applicable sections of NQA-1, Subpart 2.5
 - ECR 008891 was issued to address the calibration requirements for the Troxler

Corrective steps that will be taken to avoid future violations:

As part of the completion of CR-10-180, a review of NQA-1, Subpart 2.5 is being completed. As items are identified during the reconciliation, the Basis of Design documents will be updated and then the changes will also be incorporated into the appropriate specifications. Engineering procedure PP9-3, Design Control, requires review of the Basis of Design documents prior to change of a specification or drawing. This is scheduled to be completed by November 30, 2010

MOX Services will perform sand cone correlation testing to justify previously placed material that did not have sand cone testing. This is scheduled to be completed by November 30, 2010.

A change to the MPQAP is being drafted to document the exceptions to NQA-1, Subpart 2.5. If these exceptions are determined to be a reduction in commitment then the MPQAP change will be submitted to the NRC for approval. It will be brought to the NRCs attention that backfill work is on hold pending approval of the change. The action to complete the MPQAP change and submittal to NRC if required is scheduled to be completed by October 30, 2010.

Date when full compliance will be achieved:

MOX Services should be in full compliance by 30 November 2010.

VIO 70-3098/2010-002-003 VIO Welding Process Control Problems

Brief description of the issue:

During inspection at the Flanders' facility, the NRC inspectors identified the following four examples of Welding Process Control Problems:

Example 1 - Flanders Foreman had incorrectly signed off the weld.

Example 2 - Flanders had failed to mark weld starting point for NBX and NBY symmetrical plates.

Example 3 - Flanders welder had made the tack welds outside of procedure qualification.

Example 4 - Weld Map Reference Point not identified for a base plate symmetrical in shape and configuration.

Reason for the violation:

MOX Services review of the NRC cited violation has determined that it is accurate. The MOX Services "cause and extent of condition" reviews determined the violations cited were a combination of procedural non-compliances by individuals and situational challenges that taxed procedural controls (e.g. not providing orientation markings for weld maps for symmetrically shaped components). MOX Services has reviewed the completed vendor's Corrective Action Responses (CARs) for all conditions listed in the NRC report. The vendor's corrective actions and root causes were determined by MOX Services to be appropriate and sufficient to prevent recurrence, if properly implemented.

MOX Services reviewed its vendor oversight activities to determine the adequacy to identify the conditions cited. These oversight activities include periodic assessment of the vendor by MOX Services Quality Representative and the MOX Services Resident

Field Engineer using the MOX approved assessment guide. In addition, weekly conference calls are conducted with the vendor Project and Quality Managers and MOX Services Responsible Manager and Fabrication Engineer to discuss technical and procedural issues that have occurred and any other issues.

This review determined that the ability to completely capture all occurrences of procedural non-compliances by an individual, or observing situational challenges to established procedural controls is not available through vendor oversight activities alone. A vendor's willingness and capability to correct its operational deficiencies is essential. This review found the completed CARs demonstrate that the vendor has a learning organization. It is additionally imperative that expectations of compliant performance be projected to the vendor. The review determined that MOX Services has projected quality expectations to the vendor for performance of the contracted work.

This review looked beyond these aspects of the cited deficiencies to the generic focus of MOX oversight activities. MOX Services found opportunities to improve the effectiveness of vendor oversight. Emphasizing observation of vendor activities involving all aspects of their traceability and work control program on the production shop floor, and focusing on the vendor's performance in procedural compliance on a day-to-day basis will provide additional assurance of quality performance by the vendor.

In order to fully ascertain the cause, corrective actions, extent of condition and preventative actions of the conditions observed at Flanders; MOX Services requested a corrective action investigation be performed by the supplier based on their QA Program corrective action process. It is important that the supplier take responsibility for their QA program and its implementation. The supplier's report is attached. Flanders response includes:

- Evaluation of the Violation including cause
- Corrective Action Taken
- Action to Prevent Recurrence

Corrective steps that have been taken:

1. MOX Services issued CR-10-414 and Flanders initiated several CARs to evaluate the issue and the corrective/preventive actions.
2. MOX Services evaluated the response provided by Flanders and provided comments to ensure its adequacy. Flanders has incorporated the comments.
3. The Flanders' attached report provides the details of the specific corrective actions taken for the NRC observed adverse conditions.
4. MOX Services has included the examples of this NRC NOV in the latest lessons learned document submitted to MOX Services Glovebox suppliers on July 11, 2010.

5. MOX Services is now reviewing Flanders Travelers prior to use to ensure adequacy and proper inclusion of hold/witness points.

Corrective steps that will be taken to avoid future violations:

1. MOX Services is performing surveillances of the actions identified in the Flanders response to confirm that the actions have been taken as specified and in the intended manner. These actions are scheduled to be completed by October 30, 2010.
2. MOX Services will establish an oversight plan to verify the key elements of the Flanders preventive action plan, as discussed below, are adequately implemented:
 - Process improvement - Revision to work instructions to address material traceability requirements (reference marking for weld identification) and proper inclusion of hold and witness points into travelers during development.
 - Work performance - Reinforcing expectations for proper use of work instructions and documentation; retraining to associated procedure requirements and expectations; training to process changes; and regular lessons learned meetings with production staff.
 - Increased oversight - QA/QC surveillance with focus on adequacy of work instructions to be used on work floor and proper documentation of work. Additional dedicated production manager.
 - Establishment and monitoring of Quality Control performance goals (e.g., adequacy of work instructions for use on production floor, proper completion of work instructions)

The oversight plan is scheduled to be developed and implementation commenced by October 30, 2010.

3. MOX Services will provide additional emphasis on work performance on the production floor including documentation completion and reviews. The indicators of quality performance (e.g., Flanders performance against goals, Flanders CARs and NCRs, MOX Services SDRs, Receiving NCRs and Lessons Learned) will be reviewed monthly to determine if emphasis needs to be changed over time. This is scheduled to commence by October 30, 2010.

Date when full compliance will be achieved:

MOX Services should be in full compliance on or before December 16, 2010.

VIO: 70-3098/2010-002-004 Inadequate CGD of QL-1 Materials

Brief description of the issue:

NRC inspection team noted that the project had incorrectly specified use of PMI for verification of 304L stainless steel material for commercial grade dedication (CGD) of QL-1 materials.

Reason for the violation:

In accordance with the *MOX Project Quality Assurance Plan*, MOX Services applies the Commercial Grade Dedication process to structures, systems, and components classified as Quality Level 1 (QL-1) Items Relied On For Safety (IROFS). MOX Services relied on a material identification and validation process as specified in commercial grade dedication document DCS01-ZMJ-DS-CGD-M-65858, *Commercial Grade Item Evaluation For Ferrous Steel Material for Gloveboxes and Subassemblies* (hereafter referred to as CGD-65858) and MOX Services specification DCS01-ZMJ-DS-NTE-N-65973, *Technical Basis for Generic Critical Characteristics for Acceptance for QL-1 Materials and Purchased Parts for the MFFF* (hereafter referred to as NTE-65973). In NTE-65973 positive material identification (PMI) was performed to confirm three critical metallic constituents (chromium, manganese, and nickel) of the raw material being received, S30403 (304L) stainless steel (SS) per ASTM A240/240M for verification of materials, alloy/type/grade/class, critical characteristics for austenitic stainless steel materials for glovebox fabrication.

As noted in the NOV, MOX Services did not perform a direct verification/validation of the non-metallic compounds of the material, notably carbon. Alternatively, the verification/validation of the carbon content was performed by the MOX Services process established in NTE-65973 as represented on a Material Test Report (MTR) provided by the material commercial supplier (mill). MOX Services did not perform a Commercial Grade (CG) Survey of this supplier and the supplier was not on the MOX Services Approved Supplier List (ASL). Flanders, the glovebox fabricator, is a MOX Services approved Appendix B supplier. Flanders also did not perform a CG Survey of this CG supplier.

It was MOX Services' position that the process defined in NTE-65973 provided "reasonable assurance" that the requirements specified in procurement documents and the commercial grade dedication requirements were met. NTE-65973 specifies several inspections and checks to identify any indications of fraudulent material and establishes reasonable assurance that the received material is correctly traceable to the MTR and is in compliance with the applicable ASTM.

The metallic constituent's verification methodology defined in NTE-65973 is based upon utilizing the capability of the "XRF Spectroscopy" technology to verify the metallic constituents of 304L SS as specified in ASTM A240 and as reported on the commercial

supplier's MTR. ASTM A240 identifies the metallic constituents for S30403 (304L) SS as chromium, manganese, and nickel. Following the NTE-65973 process, if the values obtained from the PMI testing meet ASTM A240 and are within specified tolerance of values recorded by PMI, then the validity of the MTR and traceability to the material has been confirmed. Assuming these values were within specified tolerances; MOX Services determined that other reported characteristics of the material, as reported on the MTR, were valid and acceptable for use. This included the indicated carbon content which was reported on the MTR to be within the tolerance for carbon content as specified in ASTM A240.

MOX Services acknowledges that the material verification process provided in commercial grade dedication document CGD-65858 and specification NTE-65973 did not directly measure the non-metallic compounds such as carbon, sulfur, silicon, phosphorus, and nitrogen. Therefore, due to this limitation, the sole use of PMI as was implemented in NTE-65973 has been determined to not be considered adequate to differentiate between S30400 (304) and S30403 (304L) stainless steel materials.

The extent of condition could apply to any MOX Services/Process Unit Design and Commissioning (PUDC) process unit glovebox vendor/fabricator that has performed work to date. There are presently thirteen MOX Services, 10 CFR 50 Appendix B, NQA-1 approved glovebox vendors or fabricators. Each vendor could potentially utilize the material verification methodology in NTE-65973 in the performance of the commercial grade dedication of the materials of construction for their gloveboxes.

Corrective steps that have been taken:

1. MOX Services initiated CR-10-312 on June 25, 2010 to document the NRC issues identified during the NRC Inspection at the Flanders facility. Investigation to complete the Extent of Condition is in process and will be completed by November 9, 2010.
2. MOX Services is no longer using the "PMI" process as defined in NTE-65973 for commercial grade dedication of materials/metals. The Vice President of Engineering has issued interim guidance on the approach to be used during dedication for verification of metals. This effort was completed on September 18, 2010.
3. Industry Expert Consultant - A third party nuclear industry expert with both NRC power reactor and DOE facility experience was brought on the project to provide his independent professional overview assessment of the MOX Services approach to commercial grade dedication of raw material (metals) and purchased product parts. This consultant was selected because he has an extensive background directly involved with the nuclear industry practices of commercial grade dedication. He has provided consulting and training services to both the NRC staff, various NRC licensed facilities, and within the DOE complex. He has ready access to the current industry practices and is presently consulting with several

nuclear power utilities and fuel cycle facilities in support of their efforts to design, construct, license, and operate nuclear facilities. This consultant was also utilized to review the MOX Services approach to this NOV response. MOX Services' goal was to ensure that their dedication approach was consistent with current industry practices.

Corrective steps that will be taken to avoid further violations:

1. MOX Services Engineering has changed the material verification process approach for commercial grade dedication of metals to be used in IROFS applications. Method 1, *Special Tests and Inspections* or Method 2, *Commercial Grade Survey* of the supply chain participants may be utilized. Method 1 testing shall be performed by a qualified (qualified by NQA-1 Audit or commercial grade survey method) source. The Method 1 approach will include Product (chemical composition) Analysis to confirm the elemental composition for elements having an established limit/range of the applicable referenced standard and, where required, Mechanical Properties Tests to confirm the physical (tensile, yield, elongation, hardness, etc.) values for properties having an established limit/range of the applicable referenced standard.

Method 2 shall include satisfactory completion of commercial grade survey (or audits) of the participants in the material supply chain and evaluation of the complete set of chemical and physical properties data provided on the commercial material test reports (MTRs) to the applicable design requirements. The Method 2 approach will qualify the entities involved with manufacture, material handling, and analytical services, thus providing confidence in the homogeneity of the lot and certifying the chemical and physical properties data reported on the commercial MTRs. The applicable Commercial Grade Item Evaluations are scheduled to be reviewed and revised (as applicable) by February 28, 2011.

2. MOX Services Engineering has initiated a revision to CGD-65858 to clarify that this CGIE shall only be used for MFFF structural "dry" applications where there are no applicable FTS codes. The revision to CGD-65858 will be completed by October 30, 2010.
3. As noted in the NRC NOV, there is at least one reference in the MOX Services Integrated Safety Analysis Summary (ISAS) where there is an incorrect statement that gloveboxes are required to be manufactured using 304L SS. Additionally, similar references are contained in MOX Services specification DCS01-ZMJ-DS-SPE-M-19101, *Process Equipment Glovebox Design Requirements*. MOX Services Engineering will review the ISAS, the License Application (LA) and specification SPE-19101 to identify any additional areas requiring clarification. This is scheduled to be completed by November 15, 2010 and the implementation of those plans should be complete by November 30, 2011.
4. MOX Services will initiate a Corrective Action Plan that will specify the activities and actions needed to identify and disposition the specific nonconforming conditions related to fabrications in progress or completed for each of the thirteen

vendors/fabricators. Consideration of varying disposition approaches will be applied depending on whether the vendor has purchased/dedicated material or have shipped the fabricated glovebox to the MOX site or the glovebox is still within the vendor's facility. The action plans are scheduled to be completed by November 30, 2010 and the implementation of those plans should be complete by November 30, 2011.

5. MOX Services will complete the CR 10-312, Extent of Condition review and identify if any additional Corrective Actions (beyond glovebox applications) are necessary. The extent of condition review should be complete by November 9, 2010.

Date full compliance will be achieved:

Full compliance shall be achieved when Corrective Actions stated above and any additional Corrective Actions (if required) have been completed and approved in accordance with the MOX Services Corrective Action Process. MOX Services will keep the NRC apprised of changes to the projected date of full compliance. At this time MOX Services anticipates being in Full Compliance by December 31, 2011.

Enclosure 2

**Flanders (Subcontractor to Shaw AREVA MOX Services)
Supporting Documentation for the Reply to the Subject
Notice of Violation**



9/10/2010

**Flanders Response to NRC Inspection Report
Violation # - (70-3098/2010-002-003)**

To: Jim Shipp
MFFF Process Unit Design & Commissioning, Fabrication Engineer/STR
Shaw Areva MOX Services, LLC
Shaw E&I Project Manager

From: John Urton
Director of Quality Assurance
Flanders Filters – Flanders/CSC

Subject: NRC inspection Report

Flanders is pleased to provide the following response to deficiencies identified during the NRC visit to Flanders.

1. The following issues were identified:

One finding was identified and is documented as Violation (VIO) 70-3098/2010-002-003: Welding Process Control Problems. Four examples were identified involving QL-1 components (PSSC-024):

- Incorrectly Completed Welding Documentation
- Loss of Weld Traceability Control
- Unqualified Tack Welding
- Inadequate QC Inspection Control

2. Summary:

The four examples to control special processes identified above highlight a failure by Flanders Project Management and Production Management to conduct proper oversight of the production process. Two of the deficiencies identified were failures to follow approved procedures and work instructions and two of the deficiencies identified were programmatic failures to ensure that proper direction was provided in work instructions. Welding issues reviewed were isolated and are not indicative of a systematic failure; however they do serve to point out deficiencies in training effectiveness that Flanders has taken steps to correct and ensure that the lessons learned from these identified issues are incorporated into our program with additional training and oversight measures that will prevent recurrence. The two programmatic issues highlighted a failure to ensure that work instructions on the production floor were comprehensive and were being properly followed. Programmatic changes have been put into effect to correct these issues and training has been conducted to ensure that Engineering staff are familiar with work package requirements and to ensure that these lessons learned are used to improve our program.

Note: Flanders users several types of work instructions in our manufacturing process, each have a specific purpose and nomenclature. References to these are made throughout this response and for the purpose of clarity a description is as follows:

- A. Controlled Procedure: A written/approved procedure for implementation of Flanders QA Program. These begin with CP (example: CP-01-001)
- B. Work Instruction: A written/approved work instruction that details accomplishment of specific tasks related to implementation of Flanders QA Program. These begin with WI (example: WI-07-003)
- C. Traveler: A work package specific set of instructions that list detailed steps and reference drawings, procedures and work instructions. These list specific operational steps and hold points.
- D. Work Package: A complete package that includes Traveler, approved drawings, weld maps necessary to complete work on a component or assembly.
- E. Weld Map: A combination of an approved drawing that shows weld symbols and weld joint ID numbers and a spreadsheet where information related to each weld is recorded to document welder, WPS, filler material HEAT numbers, etc.

A summary of the immediate actions to address the deficiencies is identified below. Detailed corrective actions and extent of conditions are discussed in the body of the response. Program improvements and recurrence controls are discussed at the end of the response.

- Incorrectly Completed Welding Documentation
 1. Cause: Welder incorrectly signed off weld joint 153 vice weld joint 157, weld foreman did not properly verify this as a mistake prior to correcting the weld map.
 2. Immediate Corrective Action: Flanders initiated CAR 60, verified with welder that joint sign off was in error and re-verified all other weld joints were correctly signed off on the weld map.
 3. Training was conducted with weld foreman and welders to ensure proper care is exercised in the completion of weld maps and that all completed weld joints are signed off at the time the joint is complete. Reviews of other weld maps that were in production indicate that all other weld maps were correctly filled out.
- Loss of Weld Traceability Control
 1. Cause: NBY-1000 Base was symmetrical in design. Flanders Engineering did not have a requirement in the traveler to mark joint #1 to ensure joint traceability when the component was rotated.
 2. Immediate Corrective Action: Flanders initiated CAR 61 to address the issue and verified that the base plate had not been rotated from the initial weld. NBY and NBX base plates were marked to locate joint #1. Travelers and Flanders shop drawings were revised to require any symmetrical item to have permanent markings to identify joint #1.
- Unqualified Tack Welding:
 1. Cause: The welder used improper GTAW tack weld along top of joint to hold pieces in place while conducting FCAW tack welds. The welder did not use filler material while making the GTAW tack and the GTAW process was not listed on the weld map.
 2. Immediate Corrective Action: Flanders initiated NCR 586, NCR 587 and CAR 58. All tack welds were ground out to base metal and re-welded using approved FCAW procedure. NCR's were for rework on Base plates and all first pass FCAW welds were reworked and re-welded to ensure they were compliant with required specifications.
- Inadequate QC Inspection Control
 1. Cause:
 - 1.1 Flanders Traveler did not contain clear step by step instructions and did not incorporate adequate QC hold points.
 - 1.2 QC inspector made an error by signing off tack welds before all tack welds had been completed and all areas cleaned. One tack weld was identified with a crack.
 2. Immediate Corrective Action: Flanders initiated CAR's 56 and 62 and NCR's 586 and 587. The QC sign off was voided and all tack welds were ground down, joints properly cleaned and re-

welded following approved weld procedures. Travelers on the production floor were marked up to include additional hold points.

2. Details of identified Deficiencies, Corrective Actions to include Root Cause Analysis and extent of condition:

2.1 The inspectors noted that the weld map for NBY 1000 base plate was filed out showing that weld no. 153 was completed. Further inspection determined that the weld had not been started, while weld no. 157 was completed on the base plate, yet the weld map was not filled out showing that this weld was completed. When interviewed, the foreman explained that the welder had completed all the welds and filled out the portions of the weld map he had performed afterwards. This issue was identified as the first example for VIO 70-3098/2010-002-003: Welding Process Control Problems. Flanders initiated Corrective Action Request (CAR) No. 60, dated June 24, 2010, to address this issue.

2.1.1 Root Cause: Failure to follow established procedures due to ineffective training. The welder was aware of the requirement to document all welds on the weld map at the completion of the weld joint. The welder inadvertently signed off the wrong weld joint which was identified during the NRC audit. The weld foreman made an improper assumption that the wrong joint had been completed and initiated a change to the weld map without verifying this was the case with the welder involved.

2.1.2 Corrective Actions: Welders, Quality Control inspectors and welding foreman have received additional training on requirements for proper documentation of weld maps. Reviews of all weld maps in production at the time of the deficiency verified that this was an isolated occurrence. Weld maps and travelers are now kept on the production floor by the production personnel accomplishing the work. QC verifications have been ongoing and continue to show that weld maps and travelers are being properly completed at the time the activity is conducted.

2.1.3 Extent of Condition: Review of completed and in progress document packages indicate that all weld maps were completely and properly filled out and that no other work associated with the MOX project was impacted by this deficiency.

2.2 The inspectors also noted that the base plate for Glove box NBY1000 was symmetrical in shape and configuration. The inspectors observed that there was no marking or identification on this base plate to provide a reference point to identify which weld on the base plate corresponded to each weld on the weld-map, because the weld-map contained over 200 welds. With no marking on the base plate, there was no traceability to connect a weld on the base plate to the weld referenced on the weld-map. This issue was identified as the second example for VIO 70-3098/2010-002-003: Welding Process Control Problems. Flanders initiated CAR No. 61, dated June 24, 2010, to address this issue.

2.2.1 Root Cause: Failure to identify requirements. Project Engineering and Production personnel failed to consider additional requirements for symmetrical items to ensure weld joint traceability.

2.2.2 Corrective Actions: NBY-1000 base was marked to identify weld joint #1. Production drawings and travelers were revised to include requirements for appropriately identifying weld joint #1 to maintain joint traceability. NBX, KCB-4000 and KCB-7000 base frames were also marked to identify Joint #1. Engineering Work Instruction WI-08-007 (Generating a Work Package) was revised to include requirements and examples of symmetrical marking requirements. Engineering personnel have received training on the revised work instruction and lessons learned from failure to properly address symmetrical components in the Flanders traveler.

2.2.3 Extent of Condition: Review of completed and in progress document packages indicate that all items in production at the time the issue was identified have been properly marked and identified. KCB-3000 glove box and base had shipped prior to the identification of this deficiency. Flanders has identified that the KCB-3000 glove box frame (stand) was not marked to indicate joint #1. Flanders does not believe this has any impact on the base because:

- 2.2.3.0 All welds were completed using approved GTAW weld procedure
 - 2.2.3.1 All welds were conducted by Qualified and approved welders
 - 2.2.3.2 All filler material was QL-1 material that met project specifications
 - 2.2.3.3 Weld maps were completed per the requirements of MOX welding specification DCS01-ZMJ-DS-SPE-M-19107-5 was in effect at the time of production.
 - 2.2.3.4 All NDE was completed on the base and all welds met requirements.
- 2.3 The inspectors also observed tack welds and weld preparation activities for the base-plate of Glove box No. NBX1000 (Flanders drawing no. 200001822, Rev. A). The traveler and weld map called for flux core arc welding (FCAW) per Welding Procedure Specification (WPS) No. WP-38-1 Rev. 0. The inspectors identified two tack welds on the structure, which were not made using a qualified welding procedure. Upon further inspection and interviews, the inspectors determined that the tacks in question had been made by a different welder using the gas tungsten arc welding process (GTAW) without weld filler metal. The change in welder and welding process was not completed to any approved instructions and was not documented.
- This issue was identified as the third example for VIO 70-3098/2010-002-003, Welding Process Control Problems. Flanders generated NCR Nos. 586 and 587, and CAR NO. 58, dated June 23, 2010, to address this issue.
- 2.3.1 Root Cause: Failure to follow established procedures due to ineffective training. The welder was aware of the work instructions for use of FCAW weld procedure. The welder did not realize that he could not use another approved procedure without properly revising the work instruction to include the use of GTAW. The area that the welder tack welded was not an area that was to have a weld joint (this was the top of vertical plates that were to receive a fillet weld around the edges) and the welder conducted a tack weld without filler material which was outside of the WPS and PQR qualifications for the GTAW process that require the addition of filler. More effective training to the requirements of the Weld Map and WPS's would have prevented this deficiency.
 - 2.3.2 Corrective Actions: Welders, Quality Control inspectors and Welding Foreman have received additional training on requirements for proper documentation of weld maps and limits of the WPS's. All tack welds that were accomplished using GTAW without filler material were completely removed and re-welded after proper fit-up inspection using approved FCAW process. Reviews of all weld maps in production at the time of the deficiency verified that this was an isolated occurrence. QC verifications have been ongoing and continue to show that weld maps and travelers are being properly completed at the time the activity is conducted and that travelers and weld maps WPS for use and that the WPS listed is being utilized.
 - 2.3.3 Extent of Condition: NBX and NBY base frames were the first use of the FCAW welding process. Reviews were conducted on all items in the shop to verify that no other instances occurred. Review of KCB-3000 glove box which had previously shipped indicate that all welds were completed using GTAW process and all tack welds had been properly inspected prior to final weld joint.
- 2.4 Additionally, while observing activities with the base-plate of Glove box NBX1000 the inspectors reviewed the production traveler [EP NBX 02 (GB-1000) Rev. A]. The inspectors noted that the weld traveler was in the possession of the foreman and not being used by the welder. In addition, the inspectors noted that the weld traveler did not clearly identify step-by-step instructions or hold points for QC or NDE inspections. Upon questioning, the welders stated that aside from the welding procedure and the foreman's direction, they did not work to written work instructions with hold-points such as a traveler. They further stated that they knew to stop work for inspection by verbal communication with the foreman.
- As a result of this condition, it was found that the base-plate traveler had been signed by QC for approval of a weld before the tack-welds and base metal had been appropriately cleaned.

This issue was identified as the fourth example for VIO 70-3098/2010-002-003: Welding Process Control Problems. Flanders generated CAR No. 56, dated June 22, 2010 and CAR No. 62, dated June 24, 2010, and Supplier Deficiency Report No. FFI-10-SIR166-01 to address this issue.

- 2.4.1 Root Cause: Failure to identify requirements.
 - 2.4.1.0 Flanders Project Engineering and Project Quality Assurance failed to ensure that proper hold points and inspection points were identified in traveler (work instructions) for NBX1000 Glove Box.
 - 2.4.1.1 Welders were not familiar with the weld traveler that controlled the work and instead were working to verbal direction from the Welding Foreman.
 - 2.4.1.2 QC Inspector improperly signed off tack welds while other areas had not been properly cleaned, this was a training issue and lack of clarity in the work traveler contributed to the improper sign off.
 - 2.4.1.3 It was also identified that one of the tack welds had a crack in it. Additional tack welds had been accomplished after the initial tack weld sign off, interviews with the weld inspector indicate that the tack weld was not cracked at the time of the initial inspection and sign off.
 - 2.4.1.4 The QC Inspector did not ensure that all areas were properly cleaned prior to tack welds and did not ensure all tack welds were accomplished prior to signing off tack welds as complete.
- 2.4.2 Corrective Actions:
 - 2.4.2.1 Flanders initiated CAR's 56 and 62 to address programmatic failure of Traveler hold points and improper sign off by QC inspector. All signed off tack welds were voided and reworked.
 - 2.4.2.2 Hold points were written in (added) to all work packages on the floor, work instructions for Engineering were revised to provide details on development of work packages and required hold and inspection points.
 - 2.4.2.3 NCR's 586 and 587 were initiated to rework all welds on base plates that did not meet requirements or that may not have been properly reviewed during tack and fit-up inspections. Reviews of all work packages in production at the time of the deficiency verified that proper hold and inspection points were added to all work packages.
 - 2.4.2.4 QC verifications have been ongoing and continue to show that work packages have appropriate inspection points and that fit-up, tack weld and final inspections are being accomplished and signed off as appropriate.
- 2.4.3 Extent of Condition: Reviews were conducted on all work packages in production to verify hold and inspection points were properly identified or added where needed. KCB-3000 work package (previously shipped) was reviewed and all required hold and inspection points had been properly listed in the work packages and had been signed at the appropriate points.

2. Action to Prevent Recurrence:

The individual deficiencies identified during the audit all relate to a lack of detail on the production floor and ineffective training to existing procedures for Flanders personnel. Corrective actions have been implemented associated with the various Flanders internal Corrective Action Requests listed above. Additional training activities with production personnel are being implemented to include weekly meetings to discuss expectations and attention to detail. Full implementation of training schedules and effectiveness reviews for corrective actions are expected to be complete by 9/30/2010.

Specific Actions being taken to enhance communication, benefit from lessons learned and provide proper oversight include:

- The addition of a dedicated Production Manager to provide additional oversight and training to production personnel.
- Weekly meetings with production personnel to discuss lessons learned during the week and to provide specific procedure and work instruction training.
- Weekly QC assessments of work package maintenance on the production floor with posted feedback to production personnel.

- Production, Quality Assurance and Engineering reviews of work packages and travelers prior to release to ensure accuracy.
- Development of written expectations for Engineering, Production and Quality Control performance goals with weekly assessments being performed out through December 2010 to determine effectiveness of corrective actions. Assessment frequency after December 2010 will be modified based upon results. These written expectations and assessment plans will be developed and implemented prior to 9/30/2010.

Status of Internal CAR's and NCR's:

NCR 586: Closed

NCR 587: Closed

CAR 56: Closed

CAR 58: Closed

CAR 60: Corrective Actions complete, final effectiveness review complete by 9/24/10

CAR 61: Corrective Actions complete, final effectiveness review complete by 9/24/10

CAR 62: Corrective Actions complete, final effectiveness review complete by 9/24/10



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